

enterprise, 1750-1885—landowners attempted by their own efforts to re-establish the depleted woodlands, and they were aided only by voluntary associations like the Society of Arts and the Dublin Society, which encouraged effectively the planting of trees by their prizes and premiums. During the war, when it was a choice between importing food or timber, it was the timber available in privately owned plantations that enabled the people to be fed.

In the third period—that of inquiry, 1885-1915—it was gradually borne in upon the public mind that unaided private enterprise could no longer cope with the growing demand for timber by our ever-increasing industries and that the primeval forests of the world were not inexhaustible. Imported timber increased continuously in price during these thirty years. Select Committees, Departmental Committees, and Royal Commissions on Forestry followed in quick succession and made recommendations which were mostly unheeded. The Development Commissioners appointed in 1909 failed “to purchase and plant land found after inquiry to be suitable”—one of the duties imposed upon them—but it must be admitted that they did useful pioneer work in providing increased educational facilities, in appointing advisory forest officers, and in encouraging with loans certain municipalities to afforest their water-catchment areas. The state of affairs, practically much inquiry and no afforestation, was unsatisfactory in time of peace. One year of war showed how critical the position was in a time of national emergency.

The final stage in our forest history—that of State action, which began in 1915 with the setting up of Lord Selborne's Committee to expedite home fellings of timber—is characterised by the adoption of a definite national forest policy by the Government, which was approved by Parliament when the Forestry Act was passed in 1919. This policy has two aims. Its ultimate objective is the creation in the British Isles of reserves of

standing timber sufficient to tide the nation over three years in time of war. For this purpose the State must afforest 1,770,000 acres of new land—1,180,000 acres in forty years, and the whole in eighty years—and at the same time secure the continuance under timber (with an increased production) of the 3,000,000 acres of private forests which existed in 1914. The immediate objective is a ten-year scheme, based on a block grant of 3,500,000*l.* In this decade the Forestry Commission will afforest 150,000 acres of new land owned or leased by the State. The Commission is also bound to aid private owners and local authorities in planting 110,000 acres during the ten years.

The Report shows that there is no difficulty in the State acquiring and planting the acreage mentioned in the preceding programme. It is another story with regard to private forestry, for aid to which the Commissioners set aside 327,000*l.*, of which 137,000*l.* has been allotted to proceeds-sharing schemes between private individuals or corporate bodies and the State, and 190,000*l.* to grants and loans. However, the proceeds-sharing schemes, being hedged round with cumbersome rules to safeguard the public purse for the period of a rotation (fifty to one hundred years), are unpopular with landowners. Similarly, the statutory regulations, under which 2*l.* grants per acre are made for planting, prove to be so onerous as to offer no inducements to private individuals. The Commission must obtain powers to amend these regulations, which defeat the object of assisting landowners to make plantations.

The Report gives a detailed account of the operations carried out during the year, illustrated with a map showing the land acquired and the present planting centres. Education, research and experiments, and publications are dealt with briefly. Tables of imports of timber, statutory orders and rules, and other official documents conclude a Report which deserves to be studied by all interested in the progress of forestry in this country.

Notes.

THE classical experimental plots which Lawes and Gilbert started at Rothamsted have been of the greatest service to agricultural science, and their importance is constantly increasing. Fundamental questions in the physics, chemistry, and biology of agriculture can be attacked with more confidence in the light of results obtained from long-continued field experiments carried out on a systematic plan. Further, the results are capable of statistical examination. The importance of the Rothamsted experiments led to the institution of a parallel series at Woburn in 1876 by the Royal Agricultural Society. The Woburn soil is light and sandy, but that at Rothamsted is a heavy loam. The two series of experiments enable instructive comparisons to be made between these two soil types. All interested in agricultural science received with concern the decision of the council of

the Royal Agricultural Society to relinquish—owing to economic conditions—the Woburn experiments. Fortunately the danger has been averted. Arrangements have been made for the experiments to be continued under the auspices of, but legally distinct from, the Rothamsted Experimental Station. The general portion of the Woburn farm will continue under the direct control of Dr. A. J. Voelcker, who for many years has carried out the duties on behalf of the Royal Agricultural Society. The new arrangement will not only ensure the continuance of the valuable work already done, but will also lead to a closer contact with the work of Rothamsted.

At our request, Prof. C. Runge, of Göttingen, has been good enough to send us the following list of leading men of science in Germany who have died

since the beginning of the late war. The list is not, however, complete, and may be supplemented later. Short obituary notices of some of the men will be found in the *Geschäftliche Mitteilungen der Göttinger Gesellschaft der Wissenschaften*, 1918-19-20 (Weidmannsche Buchhandlung, Berlin S.W.68, Zimmerstr. 94):—W. Lexis, mathematician and statistician, August, 1914; W. Hittorf, physicist, November, 1914; A. von Auwers, astronomer, January, 1915; A. von Könen, geologist, May, 1915; E. Riecke, physicist, June, 1915; P. Ehrlich, physician, August, 1915; H. Solms-Laubach, botanist, November, 1915; R. Dedekind, mathematician, February, 1916; E. Mach, philosopher and physicist, February, 1916; K. Schwarzschild, astronomer, May, 1916; R. Helmert, mathematician and physicist, June, 1917; A. von Baeyer, chemist, August, 1917; G. Frobenius, mathematician, August, 1917; A. von Froriep, anatomist, October, 1917; H. Vöchting, botanist, November, 1917; C. Rabl, anatomist, December, 1917; G. Cantor, mathematician, January, 1918; L. Edinger, physician, January, 1918; E. Hering, physiologist, January, 1918; F. Merkel, anatomist, May, 1919; S. Schwendener, botanist, June, 1919; E. Fischer, chemist, July, 1919; H. Bruns, astronomer, 1919; Th. Reye, mathematician, July, 1919; W. Voigt, physicist, December, 1919; P. Stäckel, mathematician, December, 1919; W. Pfeffer, botanist, January, 1920; O. Bütschli, zoologist, February, 1920; and W. Förster, astronomer, 1920. J. Elster, physicist, and Joh. Thomae, mathematician, have died recently. In addition to the above, several other German men of science were referred to in the obituary notice of Prof. von Waldeyer in *NATURE* of May 19, and news has also reached us of the following deaths not previously recorded in these columns:—Prof. G. A. Schwalbe, Strassburg, on April 23, 1916, age seventy-one years; and Prof. Karl von Bardeleben, editor of the *Anatomischer Anzeiger*, on December 19, 1918, age sixty-nine years.

THE tendency towards a more popular form of official publications has been evident in recent annual reports of H.M. Chief Inspector of Factories. The report for 1920 is divided into twelve chapters dealing with such matters as safety, dangerous trades, welfare, lighting, etc., prefaced by an introductory general section. The work of the Departmental Committee on Lighting in Factories and Workshops has now been resumed, and the Committee is assisting in the preparation of a pamphlet summarising the chief essentials of industrial illumination. We observe that the scope of the Committee has been somewhat restricted by the prevalent demand for economy. We could wish that the demand was applied with less severity to research of this description, in a field where much remains to be learned and results of experiment may have great economic value. It is, however, gratifying to observe that the recognition of the value of good lighting is increasing. One of the strangest facts mentioned in this report is the habitual disregard, by some firms, of natural illumination. Window-space is not infrequently cramped; existing panes are found to be

broken and covered with sacking, or obscured by paint, oil, or dirt. Seeing that daylight costs nothing, and, according to recent experiments in silk factories, leads to 10 per cent. better production than average artificial lighting, this is evidently a direction in which a demand for economy might be justly pressed and expenditure on publicity well repaid. Another point commented upon in the report is the need for protection of the eyes against the "flash" of arc-welding. Apparently exposure of a few seconds may have ill effects, though fortunately cases of permanent injury seem to be rare. The cataract prevalent among glass workers is now believed to be due, not to ultra-violet rays, but to the continual exposure to intense heat. Suitable Crookes glasses would afford protection, but it is difficult to induce workers to make use of them. Here, as elsewhere, educational work, such as that conducted by the British Industrial "Safety First" Association, is clearly needed.

WE regret to see the announcement of the death, at seventy-nine years of age, of Prof. G. T. Ladd, Clark professor of metaphysics and moral philosophy in Yale University, founder of the American Psychological Association, and author of many important works on philosophy and psychology.

DR. JAMES MARCHANT, director of the National Council for the Promotion of Race-Regeneration, has been appointed a Knight Commander of the Order of the British Empire.

THE council of the Society of Chemical Industry has decided to institute a Messel memorial lecture in memory of Dr. Rudolph Messel. A gold medal with an honorarium will be presented to the lecturer, and for the present the remainder of the income from the bequest to the society will be allowed to accumulate.

WE learn from the *British Medical Journal* of August 6 that the French Academy of Medicine has elected the following foreign correspondants:—Sir Robert Philip (Edinburgh), Sir Humphry Rolleston and Sir D'Arcy Power (London), Dr. Brachet (Brussels), Prof. Christiansen (Copenhagen), Prof. L. J. Henderson (Harvard University), Dr. Lucatello (Padua), Dr. Dominguez de Oliveira (Oporto), Dr. de Quervain (Berne), and Dr. Soubbotitch (Belgrade).

DR. J. CHARCOT, the French polar explorer, sailing in the North Atlantic in his exploring vessel, the *Pourquoi Pas*, has succeeded in landing upon the islet of Rockall, which lies some 260 miles west of the Hebrides and 185 miles from St. Kilda. Rockall is a pinnacle about 75 ft. high rising from a shallow bank which has more than once proved disastrous to shipping. It has seldom been visited, and the *Times* records only five authentic instances of landing previous to Dr. Charcot. The interest of Dr. Charcot's feat lies in the geological specimens which he is reported to have obtained from the rock.

It is announced by the *Times* that Mr. Edwin Naulty, an American aviator, intends to attempt an aeroplane flight across the North Pole next month. He proposes to start from Point Barrow, in Alaska,

and hopes to reach the north-western corner of Spitsbergen. The aeroplane will carry four men and fuel for a fifty hours' flight. If conditions permit, several landings will be made on the polar ice, but if this proves impossible the 1800-mile flight will be made without descent. From Spitsbergen Mr. Naulty proposes to continue his flight *via* Norway to London. Provided clear weather is experienced, it will be possible to make valuable observations on the distribution of ice and air-currents. The flight may throw some light on the doubtful existence of land in the eastern part of the Beaufort Sea.

A TRADING expedition to Siberia *via* the Kara Sea is on the point of leaving Europe. Two cargo-boats from Liverpool, two from Hamburg, and one from Göteborg are to meet at the Russian port of Murmansk, where they will be joined by the ice-breaker *Alexandria* from Leith. The expedition is carrying about 11,000 tons of cargo, most of which is destined to enter Siberia *via* the Yenisei River. This route to Siberia has been used from a very early date, but for a long time fell into disrepute owing to the difficulties presented by ice in the Kara Sea. These difficulties, however, have been exaggerated, and for some years past one or more vessels have made the passage every summer in August or September. The expedition is being organised by the All-Russian Co-operative Society, Ltd., London.

A PROGRAMME has been issued of the autumn meeting of the Institute of Metals to be held at Birmingham under the presidency of Eng. Vice-Admiral Sir George Goodwin on September 21-23. There will be a general meeting on the morning of September 21 in the hall of the Municipal Technical School, at which the Lord Mayor of Birmingham will deliver an address of welcome. The remainder of the morning and the whole of the morning session of September 22 will be devoted to papers dealing with the constitution and properties of various metals and alloys, and, so far as time permits, each paper will be followed by a brief discussion. In addition to the formal meetings, there will be excursions to various works in or near Birmingham, and on the afternoon of Wednesday, September 21, a visit will be paid to the University of Birmingham. The guests will be received by the Vice-Chancellor, Sir Gilbert Barling, Bart., and an address delivered by the Principal, Mr. C. Grant Robertson. Full details of hotel accommodation, railway arrangements, etc., are given in the programme, which can be obtained from the Secretary, the Institute of Metals, 36 Victoria Street, S.W.1.

AFTER seven years' cessation (the result of the war) the excavations at the Meare Lake Village, near Glastonbury (Shapwick and Meare are the nearest railway stations), will be resumed by the Somersetshire Archæological and Natural History Society on August 29, and continued for three weeks (exclusive of the filling-in). The work will be under the direction of Dr. Arthur Bulleid and Mr. H. St. George Gray, who have worked in double-harness at the lake villages for a number of years. The antiquities dis-

covered in past years at Meare are exhibited in the Somerset County Museum at the society's headquarters, Taunton Castle, while those from the Glastonbury Lake Village (described in two royal quarto volumes) are to be seen, for the most part, in the museum at Glastonbury. There is a good deal of expense attaching to this work besides the labour of about eight men; the money in hand is quite insufficient for the work contemplated, and donations will gladly be received by Mr. St. George Gray at the Somerset County Museum, Taunton.

JULY was exceptionally warm and dry in many parts of England. The Greenwich Observatory records, using the civil-day values published in the Registrar-General's weekly returns, give 68.5° F. as the mean temperature for the month; the mean maximum was 81.5° and the mean minimum 55.5°. In the last eighty years, since 1841, July has been warmer only in two years, 1859 with the mean 69.5° and 1868 with the mean 68.9°, and in both 1852 and 1911 the mean temperature exceeded 68°. In July this year there were four days with the shade temperature 90° or above; the highest temperature was 94° on July 11. In 1868 there were six days in July with the shade temperature 90° or above, and July, 1881 and 1900, each had four days with 90° or above. The highest temperature on record in July at Greenwich is 97.1° in 1881. There were four days in July this year with the temperature in the sun's rays 150° or above. The total rainfall at Greenwich for the month which has just closed was 0.15 in., which is the smallest July measurement for nearly a hundred years; the only July with a smaller total was in 1825, when the amount was 0.10 in. The only other years with the July rainfall less than $\frac{1}{2}$ in. are 1835, 1864, 1878, 1906, and 1911. The rainfall has been less than the normal in each of the last twelve months from August, 1920, to July, 1921, with the exception of September, 1920. In the twelve months the total rainfall at Greenwich is 14.98 in., which is 9.43 in. less than the average for the last hundred years, and only 61 per cent. of the normal. The *Times* for August 5 gives a communication from its weather correspondent, "Driest Twelve Months." It mentions that in the east and south-east of England many places besides London had less than 0.25 in. of rain in July, whilst the measurements in some of the western districts were well above the normal. The smallest rainfall for the twelve months is 11 in. at Howden, Yorkshire, and this is stated as quite without precedent in the United Kingdom, so far as can be seen at present. At Yarmouth the rainfall for the twelve months was 12.8 in.; at Benson, Oxon, 13.1 in.; Cranwell, Lincs, 13.7 in.; Kew, 15.0 in.; and Croydon, 15.3 in. The lowest previous fall for the corresponding period at Kew since 1866 is 16.75 in. in 1890-91.

In the August issue of *Man* Major R. Burnett describes a remarkable tribe in the neighbourhood of Mosul, popularly known as "Slaveys," which possibly represents the Bedouin Solibala, of which the Russian writer Ponafidina gives an account in his "Life in the Moslem East." The "Slaveys" are a desert tribe

supposed to be the direct descendants of the Crusaders. Their dress consists of gazelle skins, and they have a cross marked on their backs. "They have no religion and no marriage laws: very poor and peaceable. It is considered unlucky to kill one of them, and they help the wounded." The Mohammedan Arabs despise them and call them "wild dogs." They are known for the shortness of their stature and the great length of their spears. They are the carpenters, blacksmiths, and doctors for man and beast among the Bedouin, and live in tents made, not of hair, but of skins. They may possibly be connected with the Negrito race which Sir Percy Sykes describes in the recently published second edition of his valuable "History of Persia."

In the *Museum Journal* for March last we find an account of an interesting series of marble vases from Ulua Valley, Honduras, which are of such an unusual type that they have given rise to much speculation. The Ulua culture, like other ancient American cultures, is without date, but it was certainly contemporary with the ancient Maya Empire, as well as with other cultured races that flourished in Mexico, Panama, and Costa Rica. The technique and ornamentation of these vases are certainly remarkable. Attempts made by Mrs. Zelia Nuttall to interpret the symbolism are sharply criticised by the writer of this paper, who remarks:—"It would be as useless to speculate concerning the symbolism of all this ornament as it would be to guess at the service for which the vessel was designed. We are at liberty to assume that so elaborate and refined an object had a ceremonial function, and that its symbolism corresponds to ideas associated with its use, but its interpretation is quite beyond our reach."

THE issue of the *Journal of the Royal Society of Arts* for July 15 is devoted to a lucid paper on the development of Bombay by Sir G. Curtis. The position of the city, including originally seven islands, had long exposed portions of the site to inundation, and the enormous commercial development necessitated extension. These difficulties are being met in various ways, the principal being the reclamation of the area known as Back Bay. The chairman, Sir W. Sheppard, commented on the magnitude of the proposed series of undertakings:—"With regard to cost, there were few works in India—indeed, none of the precise kind described—which had cost, or been expected to cost, so immense a sum as thirty millions. Even in Europe so large a scheme would be considered wonderful, and he believed the renovation of Paris cost only about half the proposed expenditure on Bombay." But this has not deterred the Governor, Sir G. Lloyd, from pressing on the work, and the people of Bombay evidently believe in the project, as they showed by raising a local loan of nearly ten millions.

DR. D. F. CURJEL has obtained records of the weights at birth of 1849 normal Indian infants; the average is 6.5 lb. This compares not unfavourably with that of European infants. The conclusion is that the high infantile mortality which prevails among Indian children is largely due to unfavourable post-natal conditions. The same author has also inquired

into the duration of reproductive life of Indian women. The average age of the onset of puberty was 13.63 years, and the average duration of reproductive life 32.14 years, both of which do not differ materially from the limits for European races (*Indian Journ. of Med. Research*, vol. viii., No. 2, pp. 363 and 366).

EXPERIMENTS have been conducted by Major J. C. G. Kunhardt and Asst.-Surg. G. D. Chitre on the eradication of plague infection by rat destruction. The observations made strongly support the view that the reduction in the rat population, resulting from plague itself (which attacks rats), is the main factor in bringing infection to a natural end, and that it yet remains to be seen if the destruction of rats by any artificial means is capable of producing or accelerating the same result. A number of rat poisons was tested, but none was found better than barium carbonate, of which three grains is a fatal dose for the rat. It is best made into a bait with dough of some grain-flour (the best grain was found to be bajri, *Pennisetum typhoideum*), and without any addition in the form of fat, sugar, condiments, etc. (*Indian Journ. Med. Research*, vol. viii., No. 3, 1921, pp. 409, 446).

IN the July issue of *The Fight against Disease*, the organ of the Research Defence Society, excerpts are given from an address by Sir John Rose Bradford at Oxford on "The Place of Experiment in the Science and Art of Medicine." Dr. Drury communicates notes on an "experiment," made by Nature herself eighteen years ago, on the protection against smallpox afforded by vaccination. In a school at Ossett there were 169 children, of whom 92 were vaccinated and 77 unvaccinated. Smallpox was introduced by a scholar, and no fewer than 37 of the 77 unvaccinated contracted the disease. Only 5 of the 92 vaccinated contracted it, all of whom had been vaccinated ten or more years previously. None of the 14 scholars who had been re-vaccinated took the disease. In the class into which the disease was first introduced (Standard IV.) all the vaccinated escaped and every one of the unvaccinated promptly took the disease.

DR. PERKINS gives in the *Journal of the Torquay Natural History Society* (vol. iii., No. 1) an account of his investigations on the food of trout caught in the Torquay reservoirs in August and September. He found that the nature of the food in the reservoir fish was very different from that of river fish. The latter appeared to be feeding on aquatic insects only, to contain much less food, and to be in an inferior condition generally. In the reservoir fish the food seemed to be composed mainly of such land insects as happen to fall accidentally on to the surface of the water under the stress of weather conditions. Dr. Perkins is of the opinion that this difference in the nature of the food is due to the fact that in the reservoirs the aquatic insects are limited in species, and the rarity or absence of some forms specially favoured by trout is the result of the extermination of the insect by the fish. The reservoir trout have thus to fall back on a source of food denied to the river fish. In a single trout's stomach Dr. Perkins found no fewer than forty-six species of land insects, the

majority of which were beetles. No insect seems to come amiss to the trout as an article of food, and so important is this source of food-supply that the active rising of the fish is dependent on the activities of the land insects at the time.

IN the Journal of the Torquay Natural History Society (vol. iii., No. 1) Mr. Harford J. Lowe gives an interesting account, compiled from original notes and manuscripts, of the excavation work accomplished by the Rev. J. MacEnergy at Kent's Cavern in Devonshire in the early years of last century. MacEnergy was the pioneer worker at this famous cave, and by his energies and enthusiasm dug up huge collections of the remains of extinct British mammals and of the work of early man in Britain. Unfortunately, the results of his work seem to have been overshadowed by the publications of his more illustrious contemporary Buckland, with whom he was in constant communication, and, although published after his death by Vivian in 1859 and Pengelly in 1869, the work accomplished by MacEnergy never seems to have received due recognition and reward. It is interesting to learn from Mr. Lowe's paper that, in spite of the prejudices and antagonistic opinions prevailing at the time, MacEnergy had more than a suspicion of the important bearing of his work on the antiquity of man in Britain. MacEnergy's collection was, unfortunately, dispersed by auction at his death, and students of this subject will be grateful to Mr. Lowe for the information which he gives as to the ultimate destination of part of it at any rate. Some of it found its way to the Jardin des Plantes, Paris, the British Museum, the Athenæum Museum, Penzance, the Plymouth Institution, and possibly to Bristol, while some at least remained at Torquay.

WE have received the first number of a new serial publication, the *Australian Museum Magazine*, issued by the Australian Museum under the editorship of the director, Dr. C. Anderson. The object of the magazine is to put the museum into more intimate relationship with its owners, the public of Australia, by keeping them in touch with the work that it is doing, by making its collections better known, by giving accurate and up-to-date information in simple language on the natural history and geology of the Commonwealth, and, in general, by showing how the museum can be of service to the nation and, conversely, in what ways the public can help the museum. Thus in this first number are to be found articles on the scope, work, and management of the Australian Museum and on museum groups, in which some insight is given into the technical work that has to be done in the preparation and exhibition of specimens, in addition to interesting accounts of Blackfellows' pictures, white ants and other Australian insects, snakes, crawling jelly-fish, and the lure of the big nugget. This experiment of rendering an account of its stewardship by the Australian Museum is one that might well be tried by other national museums. The museum is making a praiseworthy effort to stimulate a healthy pride among the people of Australia in their national institution and to secure that measure of interest and sympathy so essential if it is to

develop its activities to the fullest extent. We hope the public will respond by leaving nothing undone that will place the Australian Museum among the first of its kind.

THE publications of the Naturhistorischer Verein der preussischen Rheinlande und Westfalens for the years 1913-19 have now reached us, and show the remarkable activity of the society even during years of war. The volume of the *Verhandlungen* for 1916 was completed in 1918, and the paper used and the mode of illustration show little falling-away from the high standard of 1914. As has happened in so many countries, deterioration sets in under the conditions following the war; but even now the plates do not suffer. The work of the society is largely geological, but chemists and biologists are concerned with August Thienemann's detailed "Physikalische und chemische Untersuchungen in den Maaren der Eifel" (1913-14). The marked differences in the plankton of the various crater-lakes depend on the distribution of oxygen in the waters. The mineral springs entering from the volcanic rocks show marked differences of composition in different lakes. The author of these researches adds in 1915 a study of the midge larvæ inhabiting the Maare, and in 1917 he describes the vertical zoning of the plankton in the Ulmener Maar. In 1916 F. Goebel gives a morphological description of the well-known district of the Ruhr, on the east bank of the Rhine. F. Winterfeld, of Cologne, publishes (1918) an illustrated paper on "Der aufrechte Gang des Menschen," in which he finds no room for pessimism. He concludes that "der Mensch der Zukunft wird im geistigen Sinne des Wortes aufrecht gehen, sich aufrecht halten, gehoben durch seine Ideale." We cannot help remembering the melancholy fact that hitherto physically upright man has been preserved mainly by the compulsion of military service. Enough has been said to show the range of research embodied in these undeterred publications of the war-time.

UNDER the editorship of M. Maurice Solovine, Messrs. Gauthier-Villars et Cie are issuing a collection of "Maîtres de la Pensée scientifique" in order to keep alive the memory of the advances made in the past by the great masters in every branch of science, whether these masters are French or of other nationalities. The volumes are 6½ by 4½ in., contain about 100 pages, and are issued at about 3 francs each. Huygens's "Lumière," Clairaut's "Géométrie," Carnot's "Réflexions," and d'Alembert's "Dynamique" are amongst the works issued, some of which extend over two volumes of the series. D'Alembert's work is reproduced from the second considerably enlarged edition which appeared in 1758, fifteen years after the first. It furnishes a good example of the clear and logical methods of development of a subject which were adopted by French scientific writers of a century and a half ago.

IN the July issue of *Science Progress* Prof. W. L. Bragg gives a summary of our knowledge of the dimensions of atoms and molecules. He points out

that the kinetic theory of gases allows us, from measurements of the viscosity or the heat conductivity of a gas, to calculate the mean distance of the centres of two molecules of the gas apart when the molecules are in contact, that the constant b of Van der Waals furnishes another estimate of the distance, and that the two estimates agree in giving about 2×10^{-8} cm. for the mean radius of hydrogen and helium molecules and about 3×10^{-8} cm. for the mean radius of the molecules of argon, nitrogen, oxygen, carbon dioxide, and other gases. With these figures as a basis, X-ray crystal analysis then gives the relative positions of the atoms in the molecule of the material analysed. So far the most careful analysis of crystals of potassium chloride has, however, failed to reveal any structure corresponding to the KCl molecule. Each K atom is surrounded by six Cl atoms at equal distances from it. For chlorides the distances vary with the metal in the molecule, are large, -3 to 5×10^{-8} cm., for the first elements of a "period," and decrease to a limit 1.3 to 2.7×10^{-8} for the last elements.

MANY methods of harmonic analysis have been given of recent years. We need mention only the methods of Perry, Silvanus Thompson, and Russell. The question has now come prominently forward in connection with the disturbances induced in telephone and radio stations by the harmonics in the currents

carried by overhead power lines. The power station engineer wants the manufacturer to guarantee that the electric generator he purchases from him shall give a pure sine-shaped wave of electromotive force. As it is impossible to make the machine give an absolutely pure sine wave, limits have to be fixed on the magnitudes of the amplitudes of the harmonics in the wave. Hence harmonic analysis is a necessity. In the Journal of the Institution of Electrical Engineers (vol. lix., p. 491) Mr. A. E. Clayton gives a *résumé* of the ordinary methods and two schedules for "harmonic analysis" by means of selected ordinates. One goes to the 25th harmonic and the other to the 13th. In the one case the assumption is made that no harmonic higher than the 25th is present, and in the other that there is none higher than the 13th. Seeing that in actual electromotive-force waves there is an infinite number of harmonics present, and as only a limited number of ordinates are drawn, we should have little confidence in results obtained by a "schedule."

THE Cambridge University Press will publish shortly "The Calendar," by A. Philip, the purpose of which is to provide a concise and popular summary of the history and construction of the Gregorian calendar, with special reference to the reform of the calendar and the fixing of the Easter date.

Our Astronomical Column.

BRIGHT OBJECT NEAR THE SUN.—Prof. Campbell, Director of the Lick Observatory, reports by telegraph an object brighter than Venus that was seen on August 7 3° east of the sun and 1° south. The message states that there is no doubt of the object being a celestial object. It is either a comet or a nova. The former appears more probable, owing to the distance from the Galaxy, where most novæ appear.

VARIABLE STARS.—The Bruce 24-in. photographic telescope at Arequipa has been used for taking spectrograms of the Large Magellanic Cloud, in which Miss Leavitt some years ago detected several variable stars (Harv. Ann., vol. lx., No. iv.). Miss Cannon, in Harv. Bull. No. 754, gives the spectral type and magnitude range of eight of them as follows:—No. 884, Mc, 11.4m. to 15.5m.; No. 900, M, 12.2m. to 13.6m.; No. 2257, K5, 12.4m. to 13.2m.; No. 2435, K5, 10.8m. to 11.7m.; No. 2447, K5, 12.0m. to 12.8m.; No. 2622, K5, 13.2m. to 14.0m.; No. 2822, Mc, 9.8m. to 10.6m.; and No. 2882, Mb, 11.0m. to 13.6m. The numbers are from Harv. Ann., vol. lx. It is satisfactory to find that such faint stars are within the reach of spectroscopic analysis.

Mr. Stanley Williams contributed a paper to Monthly Notices, R.A.S., vol. lxxxi., p. 332, on the star B.D.+44-994°, which he announced as a peculiar variable, possibly of the Cepheid type. Miss Cannon gives its spectral type as Ma; and Miss Leavitt has identified 150 images of the star on plates taken during the last twenty years. Its normal photographic magnitude is 10.5m., but on seven dates it was 10.2m.; it is very red (Harv. Bull., No. 754).

C. Hoffmeister, director of Sonneberg Observatory, noted on May 30 last, while observing Reid's comet, an 8th magnitude star that is not in the B.D. Its position for 1855.0 is γ h. 57.0m., N. $58^{\circ} 14'$, and it is shown on the Harvard plates. Prof. Küstner has

examined the original observations of the B.D., and finds that a star of 9.5m. was observed in the place on February 19, 1858, but not seen again, so it is probably variable (*Astr. Nach.*, Circ. 22). In the same circular H. Fuss announces that B.D.+42-3351°, 7.5m., has the large proper motion of $+0.065$ s., $+0.16''$.

MR. FLINT'S PARALLAX OBSERVATIONS.—Publications of Washburn Observatory, vol. xiii., part 1, contains the details of the series of meridian observations for stellar parallax made at Washburn between 1898 and 1905 with the Repsold meridian circle of 12.2 cm. aperture, fitted with a travelling-wire micrometer.

The programme extended from declination -35° to $+90^{\circ}$, and embraced stars from magnitude 1.5 to 2.5, with some binaries and stars of sensible proper motion. A screen with thin metal slats rotating about their axes like the laths of a Venetian blind was used to equalise magnitudes, 7.0m. being made the standard. Two comparison stars, one preceding, the other following, the parallax star, were used in each case.

The mean probable errors of a single observation of unit-weight and of the final parallax of each star are $0.214''$ and $0.031''$ respectively. The last quantity is of about three times the size of the probable error in the best recent photographic determinations, showing that the meridian method cannot compete seriously with the photographic. Still, the experiment was well worth making, and the research will occupy a place in the history of the subject, so that it is well to have the details published. The list of parallaxes contains 124 stars, of which the deduced relative parallax is negative in thirty-five cases. The values for Algol and Castor, $0.122''$ and $0.167''$, are about three times the accepted values, while that of Altair, $0.071''$, is only about one-third of it; but in many cases there is better agreement.